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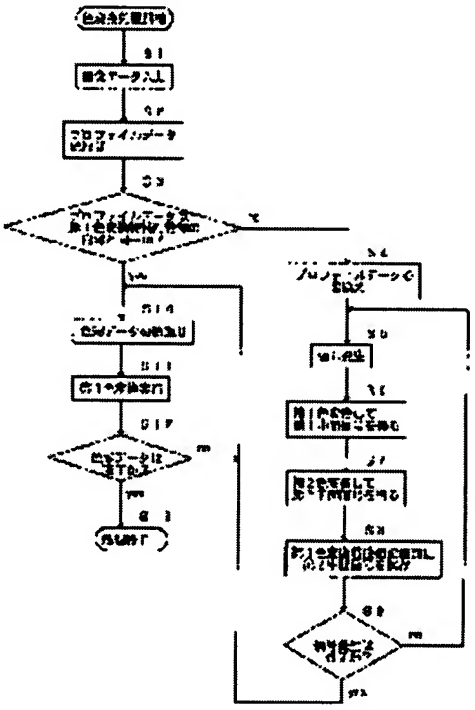
(54) COLOR CONVERTER

(57)Abstract:

PROBLEM TO BE SOLVED: To avoid a time for color conversion processing from being increased because complicated and huge amount of arithmetic operations are required resulting from difference from a color conversion characteristic for each image output device to obtain an output image with a prescribed color by processing color data of an input image.

SOLUTION: When profile data from an external CPU 4 are dissident (S3, n0), data of a 1st color conversion storage section 40 are rewritten (S4), input signals with a few numbers are generated (S5). First color conversion converting an input signal RGB corresponding to the input signal into an XYZ value is executed (S6), 2nd color conversion converting the obtained 1st intermediate value into a CMYK being a printer gradation signal based on the color conversion characteristic to be stored is executed (S7), a 3rd color conversion characteristic is generated (S8). Then the 3rd color conversion to converts the RGB signal of color data of the input image into the CMYK signal to be outputted actually is executed.



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* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to the color inverter which can raise the transform-processing speed of a color signal especially about the equipment which changes the color signal of a subject-copy image.
[0002]
[Description of the Prior Art] In recent years, since various kinds of image-processing devices came to be combined in a network, in spite of having been the same image data, it came to be regarded as questionable between different devices that the same color is unreproducible. The concept currently generally called device-independent color system is advocated in order to solve this.
[0003] As shown in drawing 6 , this intends to perform transfer of the color data between different devices with the color value (it is hereafter called a CIE value) which is displayed with values, such as a CIE1931-XYZ color coordinates (XYZ is called hereafter) and a CIE1976-L*a*b* color coordinate system (Lab is called hereafter), and which CIE (Commission Internationale de l'Eclariage) recommends, and there is. this -- a color system -- attaining -- a sake -- **** -- each -- an image processing -- a device (device) -- a color -- treating -- a signal -- a value -- [-- for example, -- a printer -- it is -- if -- cyanogen -- (-- C --) -- a Magenta -- (-- M --) -- yellow -- (-- Y --) -- black -- (-- K --) -- each -- gradation -- level -- it is -- CRT (Cathode-Ray Tube) -- a display -- it is --
[0004] In addition, this mechanism to change is called color DBMS and the thing of the transfer characteristic of color DBMS is called profile data. Based on profile data, a device color is changed into a CIE value, or color DBMS changes a CIE value into a device color. This example is explained with reference to drawing 7 .
[0005] For example, the printer 100 is connected to the exterior (central processing unit) CPU 102 in external devices, such as a personal computer, in drawing 7 . The printer 100 is equipped with the memory (RAM) 114 which can be written, and the print head 116 CPU (central processing unit)110, the memory (ROM) 112 only for read-out, and at any time. CPU110 is connected to the state which can rewrite the content of storage of RAM114. The CPU110 interior is equipped with the 1st color transducer 120 and the 2nd color transducer 122. In the ROM112 interior, the profile A126 which is the profile data of a printer 100 is memorized.
[0006] The keyboard 101 whose exterior CPU 102 is an input unit, CRT104 which is display, and the hard disk 106 which is storage are connected. In addition, you may connect further the mouse which is not illustrated as an input unit. In the hard disk 106 interior, the profile B130 which is the profile data of CRT104 is memorized. The exterior CPU 102 can rewrite the data in a hard disk 106, performs control to which a picture is displayed on CRT104, and it is constituted so that an output of printing data may be possible to a printer 100.
[0007] The 1st color transducer 120 in a printer 100 receives the printing data which the exterior CPU 102 outputs, and the data memorized by RAM114, and it is constituted so that data may be outputted to the 2nd color transducer 122. The profile A126 by which the 2nd color transducer is remembered to be data with which the 1st color transducer 120 outputs 122 in ROM112 is received, and it is constituted so that data output may be possible to a print head 116.
[0008] Then, operation is explained. A user gives directions of drawing to the exterior CPU 102 through a keyboard 101 or the mouse which is not illustrated, and the exterior CPU 102 displays a picture on CRT104 according to these directions. And if the user looked at the picture displayed on CRT104 and the desired picture has been formed, he is going to push the print execution key in a keyboard 101, and is going to get a printing sample. In this case, the exterior CPU 102 is each gradation signal (RGB is called hereafter.) of the RGB three primary colors in the additive mixture of colors on CRT104 of the picture displayed. In addition, the profile B130 which is the profile data of CRT104 remembered to make the number of gradation of each primary color into 256 stages of 0<=R, G, and B<=255 by the hard disk 106 is outputted to a printer 100 side.

[0009] Then, color transform-processing operation in the printer 100 interior is explained, referring to the flow chart of drawing 8 . When color transform processing is started, a printer 100 receives the profile B130 which is the profile data of CRT104 from the exterior CPU 102 (S100), and is made to save it to the predetermined field of RAM114 (S101). An end of preservation of Profile B starts reception of 3 stimulus value (R, G, B) of image data (S102). Then, in the 1st color transducer 120, the profile B saved at RAM114 is read, and an RGB-color-coordinates signal is changed into an XYZ color coordinates signal based on the method of mentioning later (S103). Then, based on the following (1) formula, this 3 stimulus value (X, Y, Z) is changed into a signal (L, a, b) (S104).

[0010]

L=(Y/Yn)1/3 *116 -16a=500*((X/Xn)1/3-(Y/Yn)1/3)..... (1)b=200*((Y/Yn)1/3-(Z/Zn)1/3)

In addition, it is the value of each component [in / an XYZ color coordinates / * and / in X Y, and Z], Xn, Yn, and Zn are the values of X, Y, and Z of the standard white specified by the profile B130, and L, a, and b are the values of each component in the color space which uses the 3-dimensional rectangular coordinates of a Lab color coordinate system. / an asterisk

[0011] Then, based on the profile A126 memorized in ROM112 by the 2nd color transducer 122, the value of L, a, and b is changed by the method of mentioning later to the signal of C (cyanogen), M (Magenta), Y (yellow), and K (black) which are the control signal of a print head 116 (S105). And processing will be ended, if it judged whether reception of image data was completed (S106) and has ended (S107). When reception is not completed by S106, it returns to processing of the above S102.

[0012] Then, the conversion method from R and G which are processing of S103, and B signal to X, Y, and Z signal is explained in full detail. First, the composition of a profile B130 is explained. gamma which is the value (coefficient) which shows the relation between a gradation signal and the brightness value which emits light, X for every primary color and Y, and Z value are memorized every three primary colors of CRT104 by the profile B130. R, G, and B value are changed into X, Y, and Z value according to the formula (2) shown below based on these values.

[0013]

[Equation 2]

$$\left.\begin{aligned} SR &= (R/255)^{\gamma r} \\ SG &= (G/255)^{\gamma g} \\ SB &= (B/255)^{\gamma b} \\ X &= SR*Xr + SG*Xg + SB*Xb \\ Y &= SR*Yr + SG*Yg + SB*Yb \\ Z &= SR*Zr + SG*Zg + SB*Zb \end{aligned}\right\} \quad \cdots\cdots\cdots (2)$$

In addition, in the aforementioned formula (2), R, G, and B are each gradation value in three primary colors, and gammar, gammag, and gammab are the gamma values for every component in three primary colors, and are the number of powers. Moreover, SR, SG, and SB are the brightness values for every component in three primary colors, Xr, Yr, and Zr are the XYZ values of R (red) light, Xg, Yg, and Zg are the XYZ values of G (green) light, and Xb, Yb, and Zb are the XYZ values of B (blue) light. Among these, it is the gamma value of gammar, gammag, and gammab, and each XYZ value of Xr, Yr, Zr, Xg, Yg, Zg, Xb, Yb, and Zb which are memorized as a profile B130.

[0014] Then, the processing changed into C, M and Y which are the control signal of a print head 116, and K signal from L and a which are processing of S105, and b signal is explained. First, the composition of a profile A126 is explained with reference to drawing 9 . This space W is divided at arbitrary equal intervals supposing the space W which sets the shaft which intersects perpendicularly as L, a, and three values b Becoming. Each divided field will be called small solid J. The output value (CMYK value) when the Lab value in each peaks (A, B, C, D, E, F, G, H, etc.) of one of the small solids J of this is inputted is calculated beforehand. It is the profile A126 which memorizes the CMYK value in all the peaks in Space W.

[0015] If arbitrary Lab values (following input value P) are given, it will judge in which small solid J an input value P is contained. Next, the CMYK value in each peak of this small solid J is searched from a profile A126. Here the CMYK value (Ac, Am, Ay, Ak) of each peak (Bc, Bm, By, Bk) (Cc, Cm, Cy, Ck) (Dc, Dm, Dy, Dk) (Ec, Em, Ey, Ek) (Fc, Fm, Fy, Fk) (Gc, Gm, Gy, Gk) (Hc, Hm, Hy, Hk) It carries out. Moreover, the Lab value of an input value P is set to (PL, Pa, Pb), the Lab value in the peak A is set to (AL, Aa, Ab), and the Lab value in the peak H is set to (HL, Ha, Hb) (hereafter, even if it reaches each peaks B, C, D, E, F, and G, the predetermined subscripts L, a, and b are attached and expressed).

[0016] Then, it interpolates based on a formula (3) and the CMYK value (Pc, Pm, Py, Pk) over an input value P is computed (refer to drawing 10).
[0017]
[Equation 3]

$$\left.\begin{aligned} Pc &= KA*Ac+KB*Bc+KC*Cc+KD*Dc+KE*Ec+KF*Fc+KG*Gc+KH*Hc \\ Pm &= KA*Am+KB*Bm+KC*Cm+KD*Dm+KE*Em+KF*Fm+KG*Gm+KH*Hm \\ Py &= KA*Ay+KB*By+KC*Cy+KD*Dy+KE*Ey+KF*Fy+KG*Gy+KH*Hy \\ Pk &= KA*Ak+KB*Bk+KC*Ck+KD*Dk+KE*Ek+KF*Fk+KG*Gk+KH*Hk \end{aligned}\right\} (3)$$

Here, KA, KB, KC, KD, KE, KF, KG, and KH are weighting factors, and are computed from the formula (4) shown below.
[0018]
[Equation 4]

$$\left.\begin{aligned} KA &= (TL-SL)*(Ta-Sa)*(Tb-Sb)/(TL*Ta*Tb) \\ KB &= (TL-SL)*(Ta-Sa)*Sb/(TL*Ta*Tb) \\ KC &= (TL-SL)*Sa*(Tb-Sb)/(TL*Ta*Tb) \\ KD &= (TL-SL)*Sa*Sb/(TL*Ta*Tb) \\ KE &= SL*(Ta-Sa)*(Tb-Sb)/(TL*Ta*Tb) \\ KF &= SL*(Ta-Sa)*Sb/(TL*Ta*Tb) \\ KG &= SL*Sa*(Tb-Sb)/(TL*Ta*Tb) \\ KH &= SL*Sa*Sb/(TL*Ta*Tb) \end{aligned}\right\} \quad \cdots\cdot(4)$$

Here, it is tangent line=HL-AL. Ta=Ha-Aa It is Tb=Hb-Ab (refer to drawing 10 which shows the distance of L between each peak in the small solid J, a, and the direction of b, respectively), and is SL=PL-AL. Sa=Pa-Aa It is Sb=Pb-Ab (refer to drawing 10 which shows the distance of L from the principal plane in the small solid J to P input values, a, and the direction of b).
[0019] Thereby, a Lab value is convertible for a CMYK value. By carrying out a deer and adopting the above composition, the always stabilized color could be reproduced in every image processing system, without being conscious of the color-reproduction property of peculiar devices, such as each CRT.
[0020]
[Problem(s) to be Solved by the Invention] however, the problem that the computational complexity concerning such conversion will be complicated as the aforementioned Prior art explained, and the processing time which must perform the aforementioned calculation to every input value P, and moreover starts a pan at conversion since image data (the number of input values P) is huge will become very long occurred Moreover, when the throughput of CPU in an image processing system tends to be raised and it was going to shorten the processing time, the cost of the CPU concerned went up and the problem of becoming an expensive color inverter occurred.
[0021] this invention is made in order to solve the trouble mentioned above, is simplifying a complicated conversion procedure and aims at offering the color inverter which can perform color conversion of image data at high speed.
[0022]
[Means for Solving the Problem] In order to attain this purpose the color inverter of invention according to claim 1 A 1st color conversion means to change an input signal into the 1st middle signal, and a 2nd color conversion means to change the 1st middle signal, A 1st transfer characteristic storage means to memorize the transfer characteristic of the 1st color conversion means, and a 2nd transfer characteristic storage means to memorize the transfer characteristic of the 2nd color conversion means, A signal generation means to output some signals among the values which an input signal can take, A 3rd transfer characteristic storage means to memorize the signal after changing the signal generated by the signal generation means by the aforementioned 1st color conversion means and the aforementioned 2nd color conversion means as the 3rd color transfer characteristic, An input signal is changed based on the transfer characteristic memorized by the aforementioned 3rd color transfer characteristic storage means, and it has a 3rd color conversion means to output this changed signal as an output signal.
[0023] Moreover, invention of a claim 2 sets a color inverter to a color inverter according to claim 1. It has an input detection means to detect the input of the aforementioned input signal, and a signal generation detection means to

detect the signal generation situation of the aforementioned signal generation means. a signal generation means After the aforementioned input detection means detects an input, generating of a signal is started, and after the aforementioned signal generation detection means detects the end of signal generation, the 3rd color conversion means is constituted so that conversion of an input signal may be started.

[0024] Furthermore, invention according to claim 3 is set to a color inverter according to claim 1. The first transform processing which changes the aforementioned input signal into the aforementioned output signal using a capacity discernment means to discriminate the signal capacity of the aforementioned input signal, and the aforementioned 1st color conversion means and the aforementioned 2nd color conversion means, It has the transform-processing change means which changes the 2nd transform processing which changes the aforementioned input signal into the aforementioned output signal using the aforementioned 3rd color conversion means based on the discernment result of the aforementioned capacity discernment means.

[0025] And invention according to claim 4 is set to a claim 1 or a color inverter according to claim 3. A color transfer characteristic correction means to correct at least one side of the information memorized by the aforementioned 1st color transfer characteristic storage means and the aforementioned 2nd color transfer characteristic storage means, the [the 1st color transfer characteristic storage means and] -- it has a correction situation detection means to detect the correction situation of 2 color transfer characteristic storage means, respectively, and when a correction situation detection means detects the end of the correction by the color transfer characteristic correction means, the aforementioned signal generation means is constituted so that generating of a signal may be started

[0026] Moreover, invention according to claim 5 is equipped with an input signal range storage means to memorize the maximum and the minimum value of the value which the aforementioned input signal can take in a color inverter given in either of a claim 1 to the claims 4, and the aforementioned signal-generation means divides between the maximums and the minimum values which are memorized by the aforementioned input signal range storage means by the predetermined number, and it is constituted so that the numeric value calculated at this time may be outputted.

[0027]

[Embodiments of the Invention] Hereafter, the operation gestalt which materialized this invention is explained with reference to a drawing. Drawing 1 is the functional block diagram of the printer 2 equipped with the color inverter of the picture as 1st operation gestalt, and the printer 2 is connected to the state in external devices, such as a personal computer, in which the exterior CPU 4 and data transfer are possible. The printer 2 is equipped with CPU10, nonvolatile RAM 12, ROM14, the keyboard 16, and the print head 18.

[0028] In the CPU10 interior, the data input section 20 and the transfer characteristic correction section 22 as a color transfer characteristic correction means, Similarly The selection value correction section 34 as the color transfer characteristic correction section, and the signal generator 24 as a signal generation means, The 1st color transducer 26 as a 1st color conversion means, the 2nd color transducer 28 as a 2nd color conversion means, the 3rd color transducer 30 as a 3rd color conversion means, the transfer characteristic selection section 32, and the signal property correction section 36 as a signal generation property correction means are arranged.

[0029] In the nonvolatile RAM 12 interior, the 1st color transfer characteristic storage section 40 as a 1st transfer characteristic storage means, the 3rd color transfer characteristic storage section 42 as a 3rd transfer characteristic storage means, the selection value storage section 44 as one of the 2nd transfer characteristic storage meanses, the signal generation weighted-solidity storage section 46 as a signal generation property storage means, and the channel-range storage section 48 as an input signal range storage means are arranged.

[0030] In the ROM14 interior, color transfer characteristic A storage section 14a made into other 2nd transfer characteristic storage meanses', color transfer characteristic B storage section 14b, and color transfer characteristic C storage section 14c are arranged. the color data 62 about the color picture by which the exterior CPU 4 was created with the personal computer etc., and the profile data 60 of this color data 62 -- a printer 2 -- an output -- things are made

[0031] It connects so that the aforementioned color data 62 and profile data 60 may be received from the exterior CPU 4, profile data 60 may be outputted to the transfer characteristic correction section 22 and the color data 62 may be outputted to the 3rd color transducer 30, and the data input section 20 is buffer memory. To the 1st color transfer characteristic storage section 40 and the channel-range storage section 48, the transfer characteristic correction section 22 receives profile data 60 from the aforementioned data input section 20, and reading and rewriting of each stored data are possible for it, and to the signal generator 24, it is connected so that data output may be possible.

[0032] A signal generator 24 receives the data from the aforementioned transfer characteristic correction section 22 and the selection value correction section 34, and the data of the signal generation weighted-solidity storage section 46 and the channel-range storage section 48 are connected so that reading may be possible respectively and data output may be possible to the 1st color transducer 26. The 1st color transducer 26 receives the data which a signal generator 24

outputs, and it is connected so that reading of the stored data of the 1st color transfer characteristic storage section 40 may be possible and an output of data (the 1st middle signal) may be possible to the 2nd color transducer 28. The 2nd color transducer 28 receives the data which the 1st color transducer 26 and the transfer characteristic selection section 32 output, respectively, and it is connected so that the stored data of the 3rd color transfer characteristic storage section 42 can be rewritten.

[0033] The transfer characteristic selection section 32 is connected so that reading of each stored data of the aforementioned selection value storage section 44, color transfer characteristic A storage section 14a, color transfer characteristic B storage section 14b, and color transfer characteristic C storage section 14c may be possible and data output may be possible to the 2nd color transducer 28. The selection value correction section 34 can receive the data from a keyboard 16, can rewrite the stored data of the selection value storage section 44, and it is connected so that data output may be possible to a signal generator 24. The signal property correction section 36 receives the data from a keyboard 16, and it is connected so that the stored data of the signal generation weighted solidity 46 can be rewritten.

[0034] The 3rd color transducer 30 receives the color data 62 outputted from the data input section 20, reading of the stored data (the 2nd middle signal) of the 3rd color transfer characteristic storage section 42 is possible for it, and the predetermined control signal is connected so that an output may be possible to a print head 18. In addition, in this example, the color data 62 shall have the gradation level of the arbitration (from zero up to 255) in R, G, and three color components B Becoming to one pixel. Moreover, the print head 18 is constituted so that a picture may be formed in the recording paper which is not illustrated based on the control signal which the 3rd color transducer 30 outputs.

[0035] Then, the outline of color transform-processing operation in the operation form of this invention is explained, referring to the flow chart of drawing 2 . If a color transform-processing start is carried out, first, CPU10 in a printer 2 detects the input of image data (S1), and the data input section 20 will request the output of the profile data 60 in image data from the exterior CPU 4, and will read and receive this profile data 60 (S2).

[0036] Subsequently, in the transfer characteristic correction section 22, it judges whether the contents memorized by the 1st color transfer characteristic storage section 40 and the channel-range storage section 48 in nonvolatile RAM 12 and the aforementioned profile data 60 are the same (S3). Here, when judged with it not being the same, (S3:no) and the transfer characteristic correction section 22 rewrite and save the contents of the 1st color transfer characteristic storage section 40 and the channel-range storage section 48 by the contents of profile data 60 (S4), and direct generating of a signal to a signal generator 24. A signal generator 24 generates a signal according to the contents memorized by the channel-range storage section 48 and the signal generation weighted-solidity storage section 46 (S5).

[0037] The 1st color transducer 26 changes into the 1st middle signal the signal generated in a signal generator 24 according to the contents memorized by the 1st color transfer characteristic storage section 40 (S6). Based on the information chosen by the procedure later mentioned by the transfer characteristic selection section 32, this 1st middle signal is again transformed in the 2nd color transducer 28 (the 2nd color conversion), and acquires the 2nd middle signal (S7). The 2nd middle signal acquired here rewrites the contents of the predetermined field of the 3rd color transfer characteristic storage section 42, and is saved (S8).

[0038] Subsequently, it judges whether the signal generation from a signal generator 24 still continues (S9). If it judges that generating of a signal was completed (S9:yes), the data input section 20 will start reading of the color data 62 (S10). Next, the 3rd color transducer 30 changes the color data 62 into the control signal of a print head 18 based on the contents (the 2nd middle signal) memorized by the 3rd color transfer characteristic storage section 42 (S11). And processing will be ended, if it judged whether reading of the color data 62 would be completed (S12) and has ended (S12:yes) (S13). When the signal generation from a signal generator 24 is not completed by S9, it returns to (S9:no) and S5, and processings from S5 to S9 are repeated. That is, creation of the 3rd color transfer characteristic storage section 42 is continued.

[0039] In addition, by processing of S3, when profile data 60 and the contents memorized by the 1st color transfer characteristic storage section 40 and the channel-range storage section 48 are the same, it moves to (S3:yes) and the procedure of S10. That is, the creation procedure of the 3rd color transfer characteristic storage section 42 is omitted. Moreover, if the input of the color data 62 continues by S12 (S12:no), it will return to processing of the above S10, and processing of S10-S12 will be repeated.

[0040] In addition, processing S3 corresponds to a correction situation detection means, and processing S9 corresponds to a signal generation detection means. Moreover, although processing S3 is comparing the contents memorized by the 1st color transfer characteristic storage section 40 and the channel-range storage section 48 in profile data 60, whenever profile data 60 is inputted without comparing, even if it points to generating of a signal to a signal generator 24, obstruct and there is nothing. In this case, the path which moves from processing S3 to processing S10 will be extinguished, and the processing S3 at this time will correspond to an input detection means.

[0041] Next, each detailed operation is explained. First, the composition of profile data 60 is explained. Profile data 60 is equipped with the processing information which changes the data (RGB value) of the color data 62 into a XYZ value, and the information which shows the range which the color data 62 can take. Namely, when the same processing as the thing in the profile B130 which showed the RGB value to the flow chart of drawing 7 and the conventional example of drawing 8 as processing changed into a XYZ value is adopted, In order to change a RGB value into a XYZ value, it has a gamma value (gammar, gammag, gammab) required to use it with the aforementioned formula (2), and a matrix coefficient (Xr, Yr, Zr, Xg, Yg, Zg, Xb, Yb, Zb) as information which shows transform processing.
[0042] And as information which shows the range which the color data 62 can take, it has each maximum (Rmax, Gmax, Bmax) and minimum value (Rmin, Gmin, Bmin) of the component of three three primary colors (R, G, B) of the color data 62. Next, detailed operation of the aforementioned processing S3 and the transfer characteristic correction section 22 is explained. It judges [one / every] whether if profile data 60 is received, each value of the transfer characteristic correction section 22 each value of profile data 60 is remembered to be by the 1st color transfer characteristic storage section 40 and the channel-range storage section 48 corresponds, and when all values are the same, it judges with it being the same as that of the contents profile data 60 is remembered to be by the 1st color transfer characteristic storage section 40 and the channel-range storage section 48.
[0043] Then, processing S5 and detailed operation of a signal generator 24 are explained. First, the signal generation weighted-solidity storage section 46 is explained. The value (STEP) which shows the number of partitions between the maximums and the minimum values which are the range which the color data 62 memorized by the channel-range storage section 48 can take is memorized by the signal generation weighted-solidity storage section 46. In addition, at this example, although it is only one numeric value, even if it has this value (STEP) for every component of the color data 62 in three primary colors, obstruct and there is. [no]
[0044] Furthermore, this value (STEP) may be correctable. For example, when correcting the data memorized by the signal generation weighted-solidity storage section 46 like the operation form shown in drawing 1 , the signal property correction section 36 can receive the information from a keyboard 16, and the signal property correction section 36 can correct the data memorized by the signal generation weighted solidity 46 based on these directions.
[0045] And a signal generator 24 will calculate the signal value (Rout_i, Gout_j, Bout_k) computed by the formula (5) based on the information memorized by the channel-range storage section 48 and the signal generation weighted-solidity storage section 46, if directions of signal generation are received.
[0046]
[Equation 5]

$$\left.\begin{aligned} R\_SPACE &= (Rmax - Rmin)/STEP \\ G\_SPACE &= (Gmax - Gmin)/STEP \\ B\_SPACE &= (Bmax - Bmin)/STEP \\ Rout\_i &= i * R\_SPACE + Rmin \\ Gout\_j &= j * G\_SPACE + Gmin \\ Bout\_k &= k * B\_SPACE + Bmin \end{aligned}\right\} \quad \cdots\cdots (5)$$

In addition, i, j, and k It is the suffix which shows turn and is the integral value of 0<=i, j, and k<=STEP. And every 1 set of all the combination of three signal values (Rout_i, Gout_j, Bout_k) computed by the formula (5) is outputted to the 1st color transducer 26.
[0047] That is, since a suffix will generate nine kinds of signal values of each color component from 0 to 8 when STEP is 8, the number of the signal values outputted from a signal generator 24 serves as 729 (=9*9*9) individual in total. Moreover, since 17 kinds of each signal value is generated when the value (STEP) memorized by the signal generation weighted-solidity storage section 46 is corrected to 16 by the above-mentioned signal property correction section 36, the number of the signal values outputted from a signal generator 24 becomes 4913 (=17*17*17) individual in total.
[0048] The 1st color transducer 26 performs operation which changes the color data 62 into a Lab value, and since the conversion method in the 1st color transducer 26 is the same as that of the processings S103 and S104 in the conventional example except reading data required for an operation from the 1st color transfer characteristic storage section 40, it omits detailed explanation. Moreover, since it is the same as that of the processing S105 of the conventional example except outputting the CMYK value which read data required for a conversion operation from the transfer characteristic selection section 32, and was acquired to the 3rd color transfer characteristic storage section 42,

operation of the 2nd color transducer 28 also omits detailed explanation. That is, the 2nd color transducer 28 performs operation which changes a Lab value into the CMYK value which is the control signal of a print head 18. In addition, processing operation in the transfer characteristic selection section 32 is explained in full detail behind.

[0049] And the 2nd color transducer 28 carries out storage preservation of the calculated CMYK value to the predetermined field of the 3rd color transfer characteristic storage section 42. When the space (namely, RGB space) which consists of a shaft with which each component of the color data 62 as shown in drawing 3 in three primary colors (R, G, B) intersects perpendicularly is assumed, the control signal value (namely, CMYK value) of the print head 18 to the point (every peak of each grid) of dividing this RGB space in the shape of a grid will be memorized by the 3rd color transfer characteristic storage section 42 by performing the above operation. That is, the 3rd color transducer 30 calls the data memorized by the 3rd color transfer characteristic storage section 42, is the view of transposing the input value Lab in the processing S105 of the conventional example to RGB, and changes the color data 62 into a CMYK value.

[0050] There are the following effects by performing such operation. Although the computational complexity of changing the color data 62 into a CIE value, and changing into the CMYK value which is the control signal of a print head 18 after that is very huge Very few amounts generated in a signal generator 24 (for example, when the number of STEP is 8 with the aforementioned operation form) The number of the signal values corresponding to this performs huge calculation of changing into a CMYK value, only about 729 signals. for conversion of the actual color data 62 Since it can be made a simple operation however it may be a complicated operation if a CMYK value is calculated by predetermined interpolation based on the typical value computed at this time, the processing time which conversion takes can be shortened sharply.

[0051] Since the position (coordinate) of the input value P in drawing 3 or drawing 9 makes it correspond to a coordinate from the eight peaks of a large solid and can judge as interpolation, it can ask for P (Pc, Pm, Py, Pk) which is a CMYK value corresponding to the input value P of drawing 10 by interpolation. Moreover, by generating a signal from a signal generator 24, after receiving the input of profile data 60, the 3rd color transducer 30 based on the color transfer characteristic of the profile data 60 which accompanies an input signal can be created, and an input signal can be changed into an output signal based on the color transfer characteristic of the profile data 60 which accompanies an input signal by starting the color conversion by the 3rd color transducer 30, after checking the end of the signal generation from a signal generator 24. Therefore, even if the profile data which accompanies an input signal is based on various color transfer characteristics, color conversion can be performed by the suitable transfer characteristic, and conversion according to the input signal can be performed.

[0052] Since it is accepted (when the contents of the profile data 60 inputted as the contents of the 1st color transfer characteristic storage section 40 are not in agreement) and the 3rd color transfer characteristic storage section 42 is created by performing the above-mentioned processing like S3 in the transfer characteristic correction section 22 when the property of profile data 60 changes, shortening of the processing time can be aimed at also by this.

[0053] Furthermore, since the property of the signal generated from a signal generator 24 in the signal property correction section 36 is correctable, improvement in processing speed can be aimed at by improving color conversion precision by increasing the signal of the field where color conversion precision is poor, or deleting an excessive signal and reducing the number of times of data processing. In addition, the signal property correction section 36 cannot be overemphasized by that it is not what is limited to operation made into the value set up by the user from a keyboard 16 as described in the above-mentioned example. If the property of each component of an input signal is detected by analyzing the content of storage of the 1st color transfer characteristic storage section 40 etc., for example, each component of an input signal is based on the gradation signal of CRT The signal property correction section 36 may carry out a setup which makes the division interval near low lightness fine to the information memorized by the signal generation weighted-solidity storage section 46, and when each component of an input signal is a value based on the Lab space of CIE, it may perform a setup which is divided equally.

[0054] Thus, from correcting the data memorized by the signal generation weighted-solidity storage section 46 according to the contents of the 1st color transfer characteristic storage section 40 which shows the property of an input signal, since the 3rd color transfer characteristic storage section 42 suitable for the input signal can be created, a good color reproduction can be shown. Next, detailed operation of the transfer characteristic selection section 32 is explained.

[0055] First, the data formed in the ROM14 interior are explained. The profile data for color transfer characteristic A storage section 14a changing a Lab value into the CMYK value which is the control signal of a print head, as shown also in the conventional example is memorized. That is, the thing applicable to the profile A126 of the conventional example is memorized. And what shows the color transfer characteristic different three persons, respectively from the aforementioned color transfer characteristic A storage section 14a is memorized by color transfer characteristic B

storage section 14b and color transfer characteristic C storage section 14c. It is known that it is better to change the transfer characteristic of color conversion according to the kind of picture. For example, the direction which carried out color conversion is liked so that it may reappear as a vivid color, and the direction of the conversion method which made suitable reappearance of concentration to which shade change becomes loose to a color picture like a portrait, a landscape, or photograph drawing is sensed good in many cases so that it may be easy to carry out discernment of a color to a thing like a diagram, a color picture like a graph made artificially, and the feature-extraction picture for analysis. Color transfer characteristic B storage section 14b and color transfer characteristic C storage section 14c have the property which added correction to standard color conversion in this way.

[0056] Then, operation of the transfer characteristic selection section 32 is explained. When the 2nd color transducer 28 tends to perform transform processing, the 2nd color transducer 28 concerned directs the output of a color transfer characteristic value in the transfer characteristic selection section 32. The transfer characteristic selection section 32 reads the data memorized by the selection value storage section 44, and outputs the color transfer characteristic value directed with this data. That is, the start-address value of color transfer characteristic A storage section 14a in ROM14, color transfer characteristic B storage section 14b, or color transfer characteristic C storage section 14c is memorized by the selection value storage section 44, and the transfer characteristic selection section 32 refers to the numeric value memorized by the selection value storage section 44 as the address in ROM14, and outputs the data after the address.

[0057] Selection of a color transfer characteristic value with the various transfer characteristics in ROM14 is performed by the following procedures. The correction mode of a selection value is directed from a keyboard 16. The selection value correction section 34 waits for the input of an adjusted value. A user inputs an adjusted value through a keyboard 16, and specifies color transfer characteristic A storage section 14a, color transfer characteristic B storage section 14b, or color transfer characteristic C storage section 14c. The selection value correction section 34 writes the address value the specified color transfer characteristic value is remembered to be in the selection value storage section 44.

[0058] If the selection value storage section 44 is changed, in order for the transfer characteristic of the 2nd color transducer 28 to change, it is necessary to also change the contents of storage of the 3rd color transfer characteristic storage section 42. If the selection value correction section 34 rewrites the data of the selection value storage section 44, the selection value correction section 34 directs generating of a signal to a signal generator 24. The contents of storage of the 3rd color transfer characteristic storage section 42 are correctable after this with the repeat of the same processing as S5 to S9 of drawing 2 .

[0059] There are the following effects by performing such processing and operation. First, since various color transfer characteristics can be given to a printer 2, color conversion according to liking of a user can be performed. Furthermore, since the data which point to generating of a predetermined signal to a signal generator 24, and are memorized by the 3rd color transfer characteristic storage section 42 are changed whenever it rechooses various color transfer characteristics, even if it changes the color transfer characteristic according to liking, high-speed processing is maintainable. Furthermore, since the data of the 3rd color transfer characteristic storage section 42 can be created using time after the selection value correction section 34 writes data in the selection value storage section 44 until the color data 62 are sent, the processing time generated by rechoosing the color transfer characteristic can be shortened.

[0060] Drawing 4 is the functional block diagram of the printer 2 in which the 2nd operation form of this invention is shown. In addition, the number same about what shows the 1st same effect and same composition as an operation form (refer to drawing 1) is attached, and detailed explanation is omitted. The interior of CPU10 is reached for performing the 1st transform processing (procedure) 1st color transducer 26. The 2nd color transducer 28, The change section 38 as the transform-processing change means and capacity discernment means for choosing and changing either of the 3rd color transducer 30 for performing the 2nd transform processing (procedure), and the 1st transform processing of the above and the 2nd transform processing, The threshold correction section 39 as a change property correction means is arranged. In the nonvolatile RAM 12 interior, the threshold storage section 49 as a transform-processing change property storage means is arranged.

[0061] The data input section 20 receives profile data 64 and the color data 62 from the exterior CPU 4, it changes to the transfer characteristic correction section 22, and it is connected so that data output may be possible in the section 38. The change section 38 is connected so that reading of the data which the data input section 20 outputs, and the data which the threshold storage section 49 memorizes may be possible and data output may be possible to either of the 1st transform processing which consists of the 1st color transducer 26 and the 2nd color transducer 28, and the 2nd color transform processing (the path of the dotted line of drawing 4 shows) which consists of the 3rd color transducer 30. Both the 2nd color transducer 28 and the 3rd color transducer 30 connect so that data output may be possible to a print head 18. The threshold correction section 39 reads the data memorized by the signal generation weighted-solidity storage section 46, and it is connected so that the data memorized by the threshold storage section 49 can be rewritten.

[0062] Then, processing operation of this composition is explained. First, the composition of profile data 64 is explained. The value (SIZE, size) which shows the amount of data of the color data 62 other than the data contained in the profile data 60 explained with the 1st operation form of the above-mentioned [profile data 64] is included. This SIZE may be the number of pixels of the color data 62, and may be a value for computing the number of pixels. For example, you may be the number (WIDTH) of pixels of the longitudinal direction of the color data 62, and the lengthwise number (LENGTH) of pixels. In this case, the number (SIZE) of pixels of the color data 62 can formula [following] (6) Follow, and can be computed.

[0063] SIZE=WIDTH*LENGTH ..... (6)

Such operation corresponds to a capacity discernment means. If the data input section 20 receives profile data 64, about the processing information which changes the RGB value of the color data 62 into a XYZ value, and the information which shows the range in which the color data 62 can take, these will be outputted to the transfer characteristic correction section 22 among the information included in this. After this, since it is the same as that of the 1st operation form, explanation is omitted. And this is changed and it outputs to the section 38 about other information included in profile data 64, i.e., the number of pixels of the color data 62, (SIZE). The change section 38 compares the value memorized by the threshold storage section 49 with SIZE outputted from the aforementioned data input section 20, and chooses the 1st color transform processing (color conversion procedure) or the 2nd color transform processing (color conversion procedure). For example, if it is No>=SIZE when the value memorized by the threshold storage section 49 is set to No, the 1st color transform processing is chosen, and if it is No<SIZE, the 2nd color transform processing is chosen.

[0064] and color transform processing which the data input section 20 changed the color data 62 inputted from the outside CPU 4, outputted it to the section 38, and chose the change section 38 in the previous procedure -- responding -- the [a signal generator 24 or] -- this color data 62 is outputted to either of the 3 color transducers 30 That is, if the color data 62 will be outputted to the 1st color transducer 26 through a signal generator 24 if the 1st color transform processing is chosen, and the 2nd color transform processing is chosen, the direct output of the color data 62 will be carried out to the 3rd color transducer 30. This operation corresponds to a transform-processing change means.

[0065] Since detailed operation of the 1st color transform processing by the 1st color transducer 26 and the 2nd color transducer 28 is the same as that of processing of the conventional example of S103 to S105, detailed explanation is omitted. Moreover, since detailed operation of the 2nd color transform processing which goes via the 3rd color transducer 30 is the same as that of the 1st operation form, explanation of this operation is also omitted. Even if it, in short, uses the 1st color transform processing which consists of the 1st (it does not go via 3rd color transducer 30) color transducer 26, and the 2nd color transducer 28 Output the 1st mean value obtained by the 1st color transducer 26 to the 2nd color transducer 28, and the transfer characteristic of the predetermined **** property storage section in ROM14 is chosen. Even if it uses the 2nd color transform processing outputted from the 3rd color transducer 30 based on the transfer characteristic value which the 3rd color transfer characteristic storage section 42 was made to memorize from the 2nd color transducer 28, CMYK which is finally the control signal of a print head 18 is computed, this is outputted to a print head 18, and a picture is outputted.

[0066] In addition, since the composition and the creation procedure of the 3rd color transfer characteristic storage section 42 which the 3rd color transducer 30 reads are also the same as that of the 1st example, explanation is omitted. There are the following effects by such thing for which operation is performed. As shown in drawing 5 , when the image data outputted from the outside CPU 4 has different profile data (A, B, C, D, etc.) for every fine field and the data of the 3rd color transfer characteristic storage section 42 are created for every field of the, processing speed is rather slow and there is a bird clapper. That is, when there is few color conversion in the field shown in drawing 5 than the number of signals which the signal generator 24 in drawing 1 generates, in color conversion of the field, rather than [the amount's of operations] decreases [which carries out a direct output from 28 of the 2nd color transducer using the 1st color transducer 26 and the 2nd color transducer 28] using the 3rd color transducer 30.

[0067] Then, color transform processing with quick processing speed is judged based on the number of pixels by which color conversion is carried out, and by choosing processing and operation as shown in the aforementioned 2nd operation form, color transform processing with always quick processing speed can be chosen, and it leads to improvement in the speed of processing. Moreover, the following operation can also be performed with the 2nd operation form. For example, in the 1st operation form, if it detects that the value of the signal generation weighted-solidity storage section 46 was corrected, the threshold correction section 39 will read the value with which the signal generation weighted-solidity storage section 46 was corrected, and will correct the stored data of the threshold storage section 49 based on this value. For example, if the value STEP memorized by the signal generation weighted-solidity storage section 46 is 8, 729 will be memorized in the threshold storage section 49 as a threshold, and if STEP is 16, the threshold storage section 49 will be made to memorize 4913 as a threshold. That is, the threshold storage section 49 is

made to memorize the value (No) computed by the formula (7).

[0068]

No=(STEP+1) *(STEP+1) * (STEP+1) ..... (7)

Thereby, whenever it corrects the value STEP memorized by the signal generation weighted-solidity storage section 46 so that it may agree in liking of a user, since the value No which the threshold storage section 49 is made to memorize according to this is also corrected, according to the picture, short color transform processing of the processing time can be chosen.

[0069]

[Effect of the Invention] the Ming kana since it explained above -- like according to the color inverter of invention according to claim 1 A 1st color conversion means to change an input signal into the 1st middle signal, and a 2nd color conversion means to change the 1st middle signal, A 1st transfer characteristic storage means to memorize the transfer characteristic of the 1st color conversion means, and a 2nd transfer characteristic storage means to memorize the transfer characteristic of the 2nd color conversion means, A signal generation means to output some signals among the values which an input signal can take, A 3rd transfer characteristic storage means to memorize the signal after changing the signal generated by the signal generation means by the aforementioned 1st color conversion means and the aforementioned 2nd color conversion means as the 3rd color transfer characteristic, An input signal is changed based on the transfer characteristic memorized by the aforementioned 3rd color transfer characteristic storage means, and it has a 3rd color conversion means to output this changed signal as an output signal.

[0070] therefore, the thing of the typical small number which adopted the original signal for changing by the 1st color conversion means and the aforementioned 2nd color conversion means with the signal generation means -- it is -- the [the 1st color conversion means and] -- even if each color transform processing in 2 color conversion means is huge, the number of processing decreases And since color conversion of the input signal of an input picture is carried out with the 3rd color conversion means at an output signal based on the 3rd color transfer characteristic obtained about the aforementioned central value, color transform processing by 3rd color conversion means to perform color conversion of an actual input signal can be carried out to a simple operation, and this does so the effect that the processing time of color conversion can be shortened sharply.

[0071] Moreover, invention of a claim 2 sets a color inverter to a color inverter according to claim 1. It has an input detection means to detect the input of the aforementioned input signal, and a signal generation detection means to detect the signal generation situation of the aforementioned signal generation means. a signal generation means Since generating of a signal is started after the aforementioned input detection means detects an input The color transfer characteristic of the 3rd color conversion means can be set up by color conversion based on the transfer characteristic which accompanies an input signal. and the 3rd color conversion means Since it constitutes so that conversion of an input signal may be started after the aforementioned signal generation detection means detects the end of signal generation, even if an input signal is based on the aforementioned claim 1 at various color transfer characteristics in addition to the effect of the invention of a publication It can change into a suitable output signal and a good picture can be acquired now.

[0072] Furthermore, invention according to claim 3 is set to a color inverter according to claim 1. The first transform processing which changes the aforementioned input signal into the aforementioned output signal using a capacity discernment means to discriminate the signal capacity of the aforementioned input signal, and the aforementioned 1st color conversion means and the aforementioned 2nd color conversion means, The 2nd transform processing which changes the aforementioned input signal into the aforementioned output signal using the aforementioned 3rd color conversion means Since it has the transform-processing change means changed based on the discernment result of the aforementioned capacity discernment means According to the capacity of an input signal, color transform processing suitable for this can be chosen with a transform-processing change means, and, in addition to the effect of the invention of the claim 1 aforementioned publication, the effect that the processing time of color conversion can be shortened can do so.

[0073] And invention according to claim 4 is set to a claim 1 or a color inverter according to claim 3. A color transfer characteristic correction means to correct at least one side of the information memorized by the aforementioned 1st color transfer characteristic storage means and the aforementioned 2nd color transfer characteristic storage means, the [the 1st color transfer characteristic storage means and] -- it has a correction situation detection means to detect the correction situation of 2 color transfer characteristic storage means, respectively, and when a correction situation detection means detects the end of the correction by the color transfer characteristic correction means, the aforementioned signal generation means is constituted so that generating of a signal may be started

[0074] Therefore, while a good picture can be acquired since a signal is generated from a signal generation means, and the 3rd color transfer characteristic storage means becomes what always shows the color transfer characteristic based

on the 1st color transfer characteristic storage means and the 2nd color transfer characteristic storage means if at least one side is corrected among the 1st color transfer characteristic storage means and the 2nd color transfer characteristic storage means, the processing time of color conversion can be shortened.

[0075] Moreover, invention according to claim 5 is equipped with an input signal range storage means to memorize the maximum and the minimum value of the value which the aforementioned input signal can take in a color inverter given in either of a claim 1 to the claims 4, and the aforementioned signal-generation means divides between the maximums and the minimum values which are memorized by the aforementioned input signal range storage means by the predetermined number, and it is constituted so that the numeric value calculated at this time may be outputted.

[0076] Therefore, since a signal is generated with a signal generation means based on the input signal in the maximum of the input signal memorized by the input signal range storage means, the minimum value, and a dividing point in the meantime, there are few 1st middle signals, it ends, a redundant thing is lost to the data memorized by the 3rd color transfer characteristic storage means, and the effect that a good picture can be acquired now by few data capacity is done so.

[Translation done.]

* NOTICES *

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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The color inverter characterized by providing the following. A 1st color conversion means to change an input signal into the 1st middle signal A 2nd color conversion means to change the aforementioned 1st middle signal A 1st transfer characteristic storage means to memorize the transfer characteristic of the aforementioned 1st color conversion means A 2nd transfer characteristic storage means to memorize the transfer characteristic of the aforementioned 2nd color conversion means, A signal generation means to output some signals among the values which the aforementioned input signal can take, A 3rd transfer characteristic storage means to memorize the signal after changing the signal generated by the aforementioned signal generation means by the aforementioned 1st color conversion means and the aforementioned 2nd color conversion means as the 3rd color transfer characteristic, A 3rd color conversion means to change the aforementioned input signal based on the transfer characteristic memorized by the aforementioned 3rd color transfer characteristic storage means, and to output this changed signal as an output signal
[Claim 2] It is the color inverter according to claim 1 characterized by the aforementioned 3rd color conversion means starting conversion of the aforementioned input signal after the aforementioned signal generation detection means detects the end of signal generation by having the following, and the aforementioned signal generation means starting generating of a signal after the aforementioned input detection means detects an input. An input detection means to detect the input of the aforementioned input signal A signal generation detection means to detect the signal generation situation of the aforementioned signal generation means
[Claim 3] The color inverter according to claim 1 characterized by providing the following. A capacity discernment means to discriminate the signal capacity of the aforementioned input signal The first transform processing which changes the aforementioned input signal into the aforementioned output signal using the aforementioned 1st color conversion means and the aforementioned 2nd color conversion means The transform-processing change means which changes the second transform processing which changes the aforementioned input signal into the aforementioned output signal using the aforementioned 3rd color conversion means based on the discernment result of the aforementioned capacity discernment means
[Claim 4] They are the claim 1 characterized by the aforementioned signal generation means starting generating of a signal when the aforementioned correction situation detection means detects the end of the correction by the aforementioned color transfer characteristic correction means by having the following, or a color inverter according to claim 3. The aforementioned 1st color transfer characteristic storage means A color transfer characteristic correction means to correct at least one side of the information memorized by the aforementioned 2nd color transfer characteristic storage means A correction situation detection means to detect the correction situation of the aforementioned 1st color transfer characteristic storage means and the aforementioned 2nd color transfer characteristic storage means, respectively
[Claim 5] It is a color inverter given in either of a claim 1 to the claims 4 characterized by outputting the numeric value which it has an input signal range storage means to memorize the maximum and the minimum value of the value which the aforementioned input signal can take, and the aforementioned signal generation means divides between the maximums and the minimum values which are memorized by the aforementioned input signal range storage means by the predetermined number, and is calculated at this time.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the functional block diagram of the composition in the 1st operation gestalt of this invention.
[Drawing 2] It is a flow chart explaining the processing and operation in the 1st operation gestalt of this invention.
[Drawing 3] It is drawing for explaining operation of the 3rd color transducer.
[Drawing 4] It is the functional block diagram of the composition in the 2nd operation gestalt of this invention.
[Drawing 5] It is drawing explaining the composition of the image data inputted.
[Drawing 6] It is drawing explaining the concept of a device-independent color system.
[Drawing 7] It is the functional block diagram of the composition of the conventional color inverter.
[Drawing 8] It is a flow chart explaining conventional color transform processing and operation.
[Drawing 9] It is drawing of the Lab space for explaining operation of the conventional 2nd color transducer.
[Drawing 10] It is drawing showing the relation between the Lab value for explaining operation of the 2nd conventional color transducer, and a CMYK value.
[Description of Notations]
2 Printer
4 Exterior CPU
14 ROM
14a Color transfer characteristic A storage section
14b Color transfer characteristic B storage section
14c Color transfer characteristic C storage section
22 Transfer Characteristic Correction Section
24 Signal Generator
26 1st Color Transducer
28 2nd Color Transducer
30 3rd Color Transducer
34 Selection Value Correction Section
36 Signal Property Correction Section
38 Change Section
39 Threshold Correction Section
40 1st Color Transfer Characteristic Storage Section
42 3rd Color Transfer Characteristic Storage Section
44 Selection Value Storage Section
46 Signal Generation Weighted-Solidity Storage Section
48 Channel-Range Storage Section
49 Threshold Storage Section
60 64 Profile data
62 Color Data

[Translation done.]

* NOTICES *

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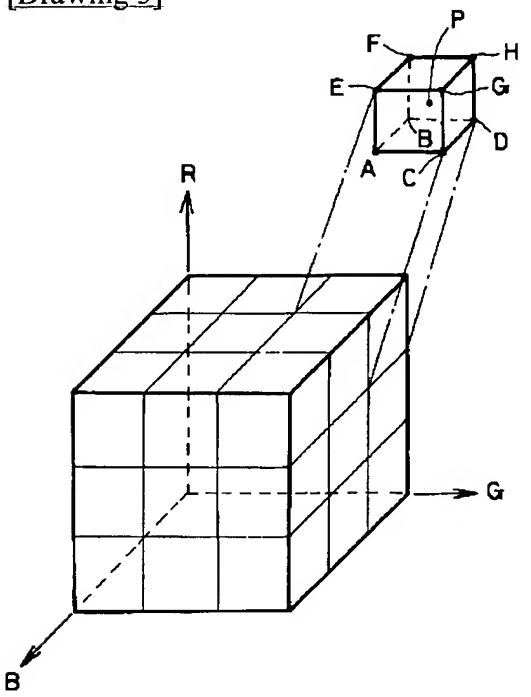
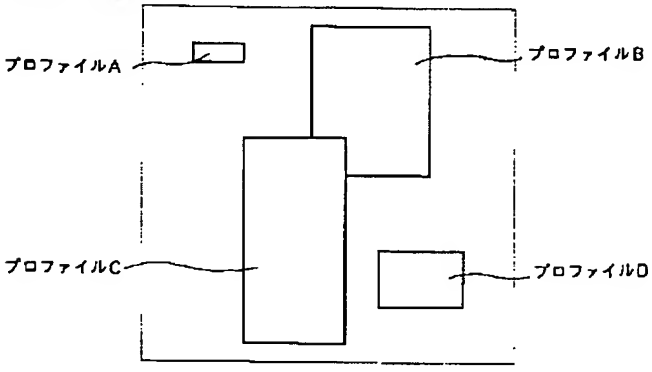
3.In the drawings, any words are not translated.

DRAWINGS

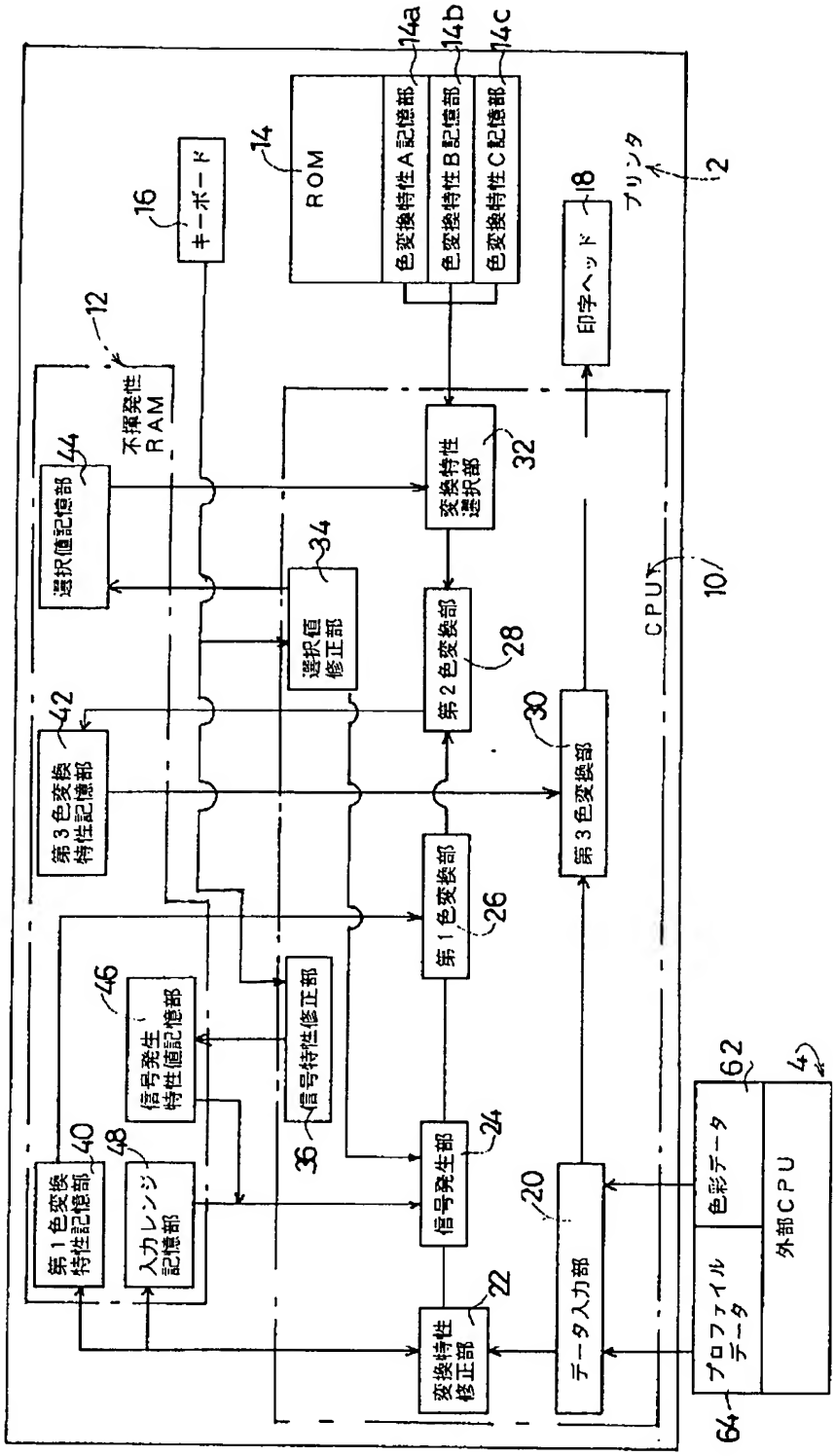
[Drawing 3]



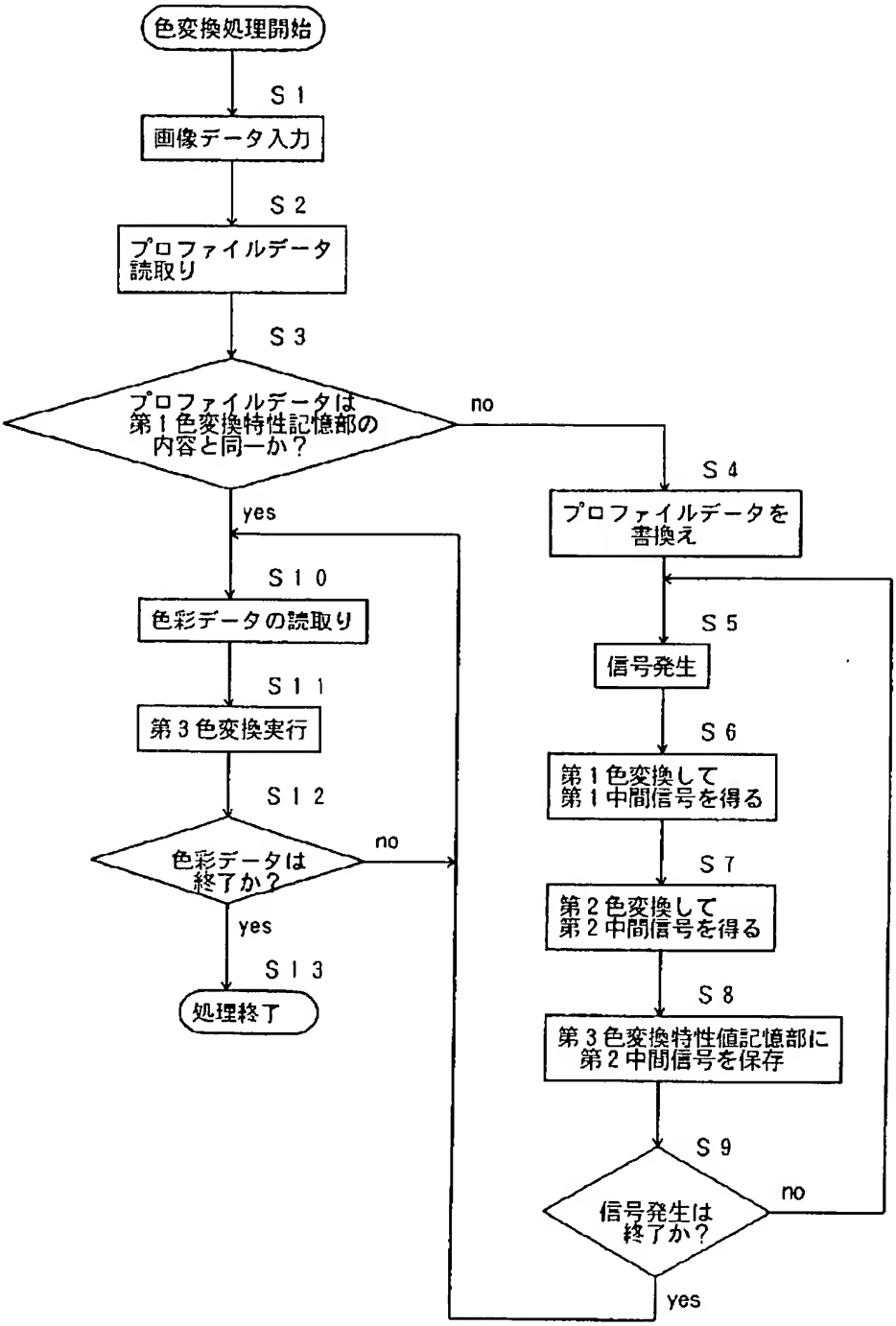
[Drawing 5]



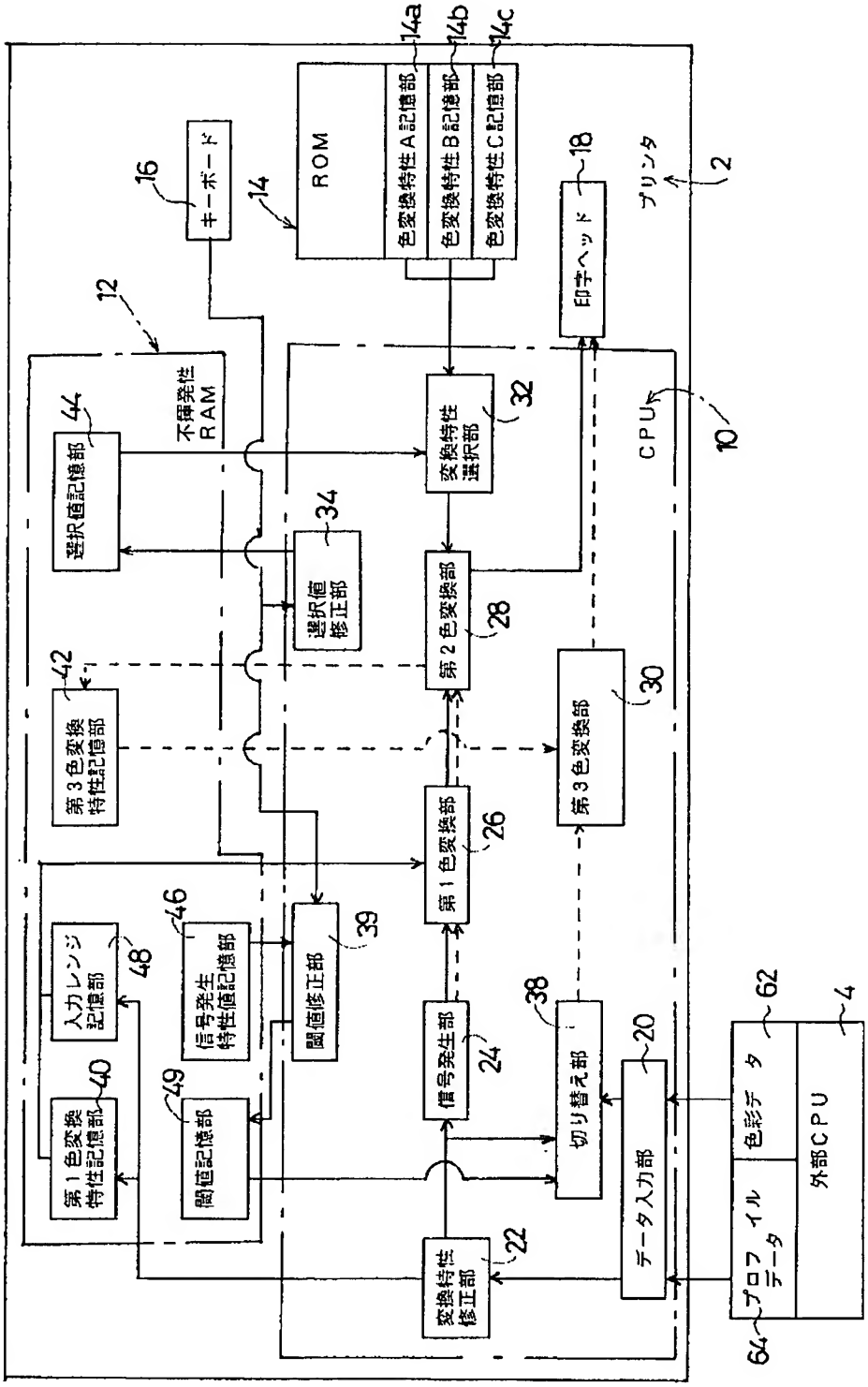
[Drawing 1]


ROM
14
14a
14b
14c
色変換特性A記憶部
色変換特性B記憶部
色変換特性C記憶部
キーボード
16
プリンタ
2
印字ヘッド
18
不揮発性RAM
12
選択値記憶部
44
変換特性選択部
32
CPU
10
選択値修正部
34
第2色変換部
28
第3色変換部
30
第3色変換特性記憶部
42
第1色変換部
26
信号特性修正部
36
信号発生特性値記憶部
46
第1色変換特性記憶部
40
入力レンジ記憶部
48
信号発生部
24
データ入力部
20
変換特性修正部
22
色彩データ
62
外部CPU
4
プロファイルデータ
64

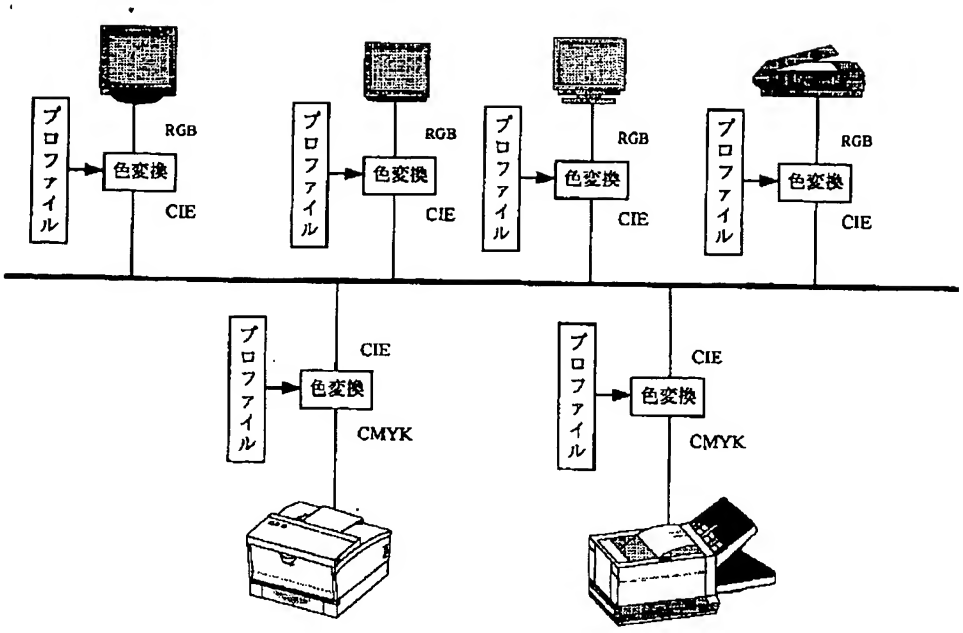
[Drawing 2]


色変換処理開始
S 1
画像データ入力
S 2
プロファイルデータ
読取り
S 3
プロファイルデータは
第1色変換特性記憶部の
内容と同一か？
no
yes
S 4
プロファイルデータを
書換え
S 5
信号発生
S 6
第1色変換して
第1中間信号を得る
S 7
第2色変換して
第2中間信号を得る
S 8
第3色変換特性値記憶部に
第2中間信号を保存
S 9
信号発生は
終了か？
no
yes
S 10
色彩データの読取り
S 11
第3色変換実行
S 12
色彩データは
終了か？
no
yes
S 13
処理終了

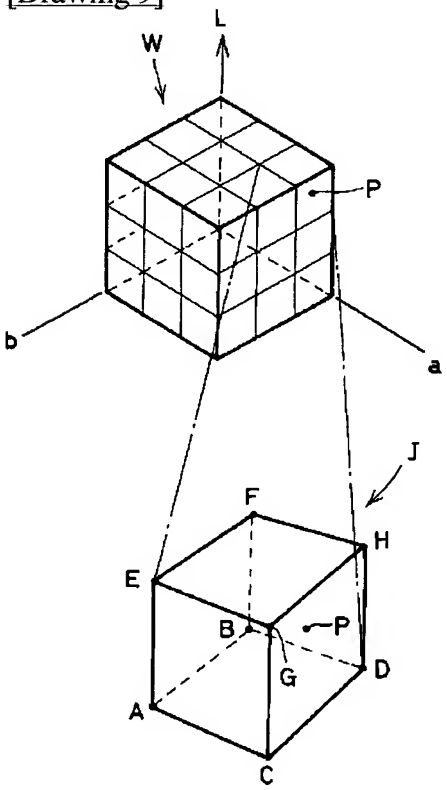
[Drawing 4]


ROM
色変換特性A記憶部
色変換特性B記憶部
色変換特性C記憶部
キーボード
印字ヘッド
プリンタ
CPU
不揮発性RAM
選択値記憶部
変換特性選択部
選択値修正部
第2色変換部
第3色変換特性記憶部
第3色変換部
第1色変換部
入力レンジ記憶部
信号発生特性値記憶部
閾値修正部
第1色変換特性記憶部
閾値記憶部
信号発生部
切り替え部
データ入力部
変換特性修正部
色彩データ
外部CPU
プロファイルデータ

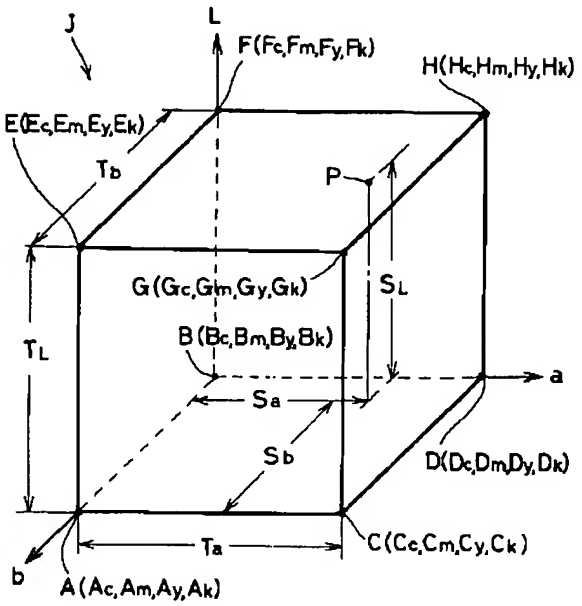
[Drawing 6]



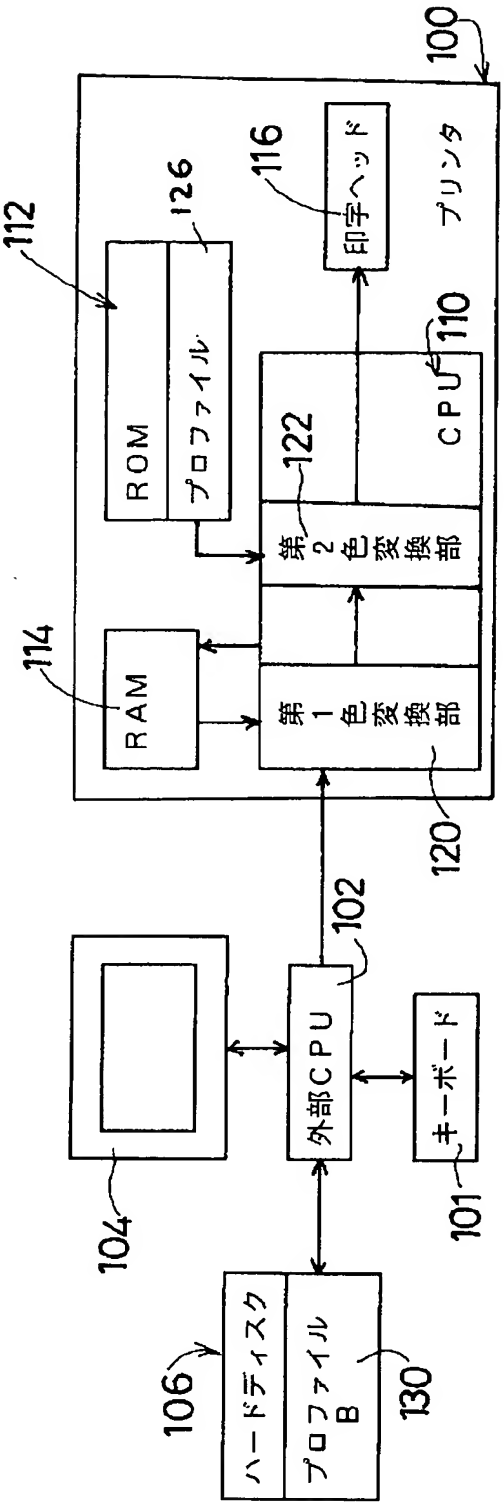
[Drawing 9]



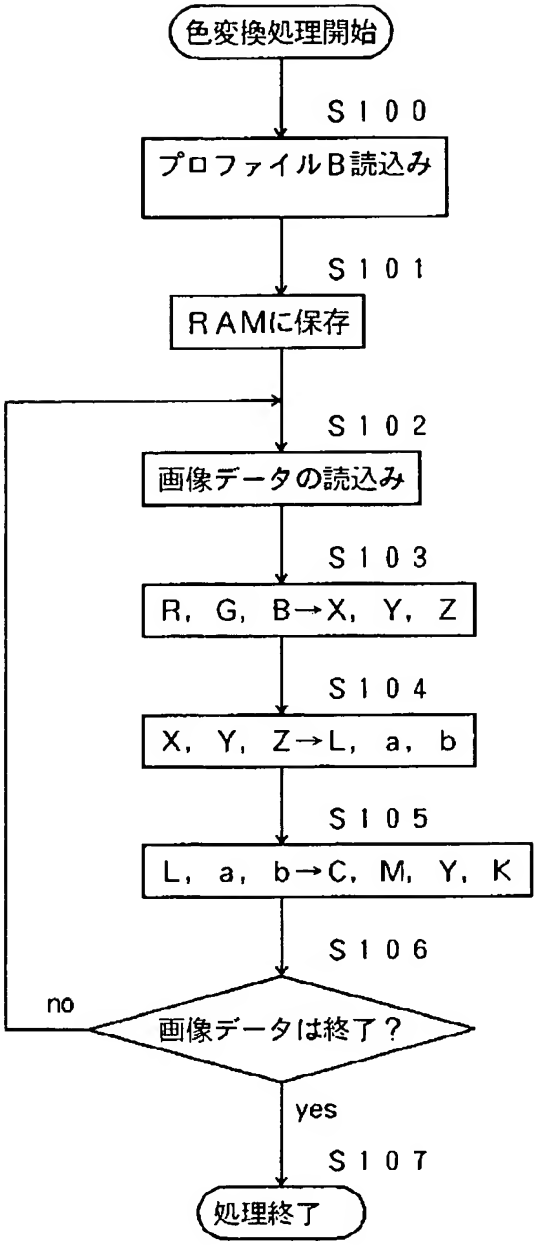
[Drawing 10]


J
L
F(Fc,Fm,Fy,Fk)
H(Hc,Hm,Hy,Hk)
E(Ec,Em,Ey,Ek)
Tb
P
G(Gc,Gm,Gy,Gk)
SL
B(Bc,Bm,By,Bk)
TL
a
Sa
Sb
D(Dc,Dm,Dy,Dk)
Ta
C(Cc,Cm,Cy,Ck)
b
A(Ac,Am,Ay,Ak)

[Drawing 7]


100
プリンタ
印字ヘッド
116
126
112
ROM
プロファイル
110
CPU
122
第2色変換部
114
RAM
第1色変換部
120
102
外部CPU
キーボード
104
101
106
ハードディスク
プロファイルB
130

[Drawing 8]



[Translation done.]